LISTING OF CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (CURRENTLY AMENDED) A method of induction heat treatment, comprising the steps of:

selecting an article for heat treatment comprising a metal wall having an upper hub portion, a lower hub portion, a bell-shaped portion that is located between the upper hub portion and the lower hub portion and a longitudinal axis extending through each of the upper hub portion, lower hub portion and bell-shaped portion, the bell-shaped portion having a bell-shaped outer surface, an inner surface and a plurality of windows extending from the outer surface to the inner surface;

selecting an induction coil comprising a hollow metal channel having a first termination portion, a second termination portion and a semi-rectangular inductor portion that is operably connected to the first termination portion and the second termination portion, said semi-rectangular inductor portion having a first semi-rectangular coil portion and a proportionally smaller second semi-rectangular coil portion; wherein the semi-rectangular inductor portion is adapted to receive the article and apply a plurality of magnetic fields to a heat treatment portion ~~thereof~~ of the article;

placing the article within the inductor portion of the induction coil;

rotating the article within the induction coil at a selected speed;

energizing the induction coil to apply the magnetic fields and produce induction currents within the heat treatment portion of the article for a time sufficient to induce heating of the heat treatment portion to a heat treatment temperature (T_H) to at least a selected case depth; and

cooling the heat treatment portion of the article to a temperature (T_C) to the selected case depth.

2. (ORIGINAL) The method of claim 1, wherein the article comprises nodular cast iron.

3. (CURRENTLY AMENDED) The method of claim 2, wherein the heat treatment portion of the article has an austenite transition temperature, and wherein T_H is greater than the austenite transition temperature.

4. (ORIGINAL) The method of claim 3, wherein said step of cooling comprises quenching the article.

5. (CURRENTLY AMENDED) The method of claim 4, wherein the heat treatment portion of the article has a martensite transformation temperature and wherein said step of cooling comprises quenching until T_C is lower than the martensite transformation temperature.

6. (ORIGINAL) The method of claim 1, wherein the article comprises a differential housing.

7. (ORIGINAL) The method of claim 6, wherein the differential housing comprises induction hardenable grade cast iron.

8. (ORIGINAL) The method of claim 7, wherein T_H is in the range of 1600 - 1900 °F.

9. (ORIGINAL) The method of claim 7, wherein said step of cooling comprises quenching the article.

10. (CURRENTLY AMENDED) The method of claim 1, wherein the semi-rectangular inductor portion comprises:

a semi-rectangular lower coil portion comprising a first L-shaped section having a first termination end, that is connected to the first termination portion, and a first lateral end, and an opposed second L-shaped section having a second termination end, that is connected to the second termination portion, and a second lateral end;

a semi-rectangular upper coil portion, having a first lateral end and a second lateral end, that is located above and is proportionately smaller than the lower coil portion;

a first lateral portion that connects the first lateral end of the upper coil portion to the first lateral end of the lower coil portion; and

a second lateral portion that connects the second lateral end of the upper coil portion to the second lateral end of the lower coil portion, wherein during the step of energizing, the first lateral portion produces a first lateral magnetic field that is adapted to act on the heat treatment portion of the ~~differential housing~~ article and the second lateral coil portion produces a second lateral magnetic field that is adapted to act on the heat treatment portion of the ~~differential housing~~ article.

11. (ORIGINAL) The method of claim 10, wherein the step of energizing comprises the application of an electric current to the induction coil having a frequency in the range of about 10 kHz.

12. (CURRENTLY AMENDED) A method of induction heat treatment of a heat treatment portion of a differential housing, comprising the steps of:

selecting an induction coil comprising a hollow metal channel having a first termination portion, a second termination portion and a semi-rectangular inductor portion that is operably connected to the first termination portion and the second termination portion, said semi-rectangular inductor portion including a first semi-rectangular coil portion and a second semi-rectangular portion, said second semi-rectangular portion being approximately parallel to said first semi-rectangular portion; wherein the inductor portion is adapted to receive the ~~article~~ differential housing and apply a plurality of magnetic fields to a heat treatment portion thereof;

placing the ~~article~~ differential housing within the inductor portion of the induction coil;

rotating the ~~article~~ differential housing within the induction coil at a selected speed;

energizing the induction coil to apply the magnetic fields and produce induction currents within the heat treatment portion of the ~~article~~ differential housing for a time sufficient to induce heating of the heat treatment portion to a heat treatment temperature (T_H) to at least a selected case depth; and

cooling the heat treatment portion of the ~~article~~ differential housing to a temperature (T_C) to the selected case depth.

13. (ORIGINAL) The method of claim 12, wherein the differential housing comprises nodular cast iron.

14. (CURRENTLY AMENDED) The method of claim 13, wherein the heat treatment portion of the differential housing has an austentite transition temperature and wherein T_H is greater than the austenite transition temperature.

15. (ORIGINAL) The method of claim 14, wherein T_H is in the range of 1600 - 1900 °F.

16. (ORIGINAL) The method of claim 14, wherein said step of cooling comprises quenching the differential housing.

17. (CURRENTLY AMENDED) The method of claim 16, wherein the heat treatment portion of the differential housing has a martensite transformation temperature and wherien said step of cooling comprises quenching until T_C is lower than the martensite transformation temperature.

18. (CURRENTLY AMENDED) A housing, comprising:

a metal wall having an upper hub portion, a lower hub portion, a bell-shaped portion that is located between the upper hub portion and the lower hub portion, a longitudinal axis extending through each of the upper hub portion, the lower hub portion and the bell-shaped portion, and a circumferential hardened case, said metal wall further including an inner surface and an outer surface and wherein the bell-shaped portion ~~having~~ has ~~a bell-shaped outer surface, an inner surface and~~ a plurality of windows extending from the outer surface to the inner surface, the circumferential hardened case extending inwardly from the ~~bell-shaped~~ outer surface in a heat treatment portion which is located between the window and the upper hub portion, wherein the hardened case is formed by an induction heat treatment.

19. (CURRENTLY AMENDED) The ~~article~~ housing of claim 18, wherein the induction heat treatment comprises the steps of:

selecting an induction coil comprising a hollow metal channel having a first termination portion, a second termination portion and a semi-rectangular inductor portion that is operably connected to the first termination portion and the second termination portion; wherein the inductor portion is adapted to receive the article and apply a plurality of magnetic fields to a heat treatment portion thereof;

placing the article within the inductor portion of the induction coil;

rotating the article within the induction coil at a selected speed;

energizing the induction coil to apply the magnetic fields and produce induction currents within the heat treatment portion of the article for a time sufficient to induce heating of the heat treatment portion to a heat treatment temperature (T_H) to at least a selected case depth; and

cooling the heat treatment portion of the article to a temperature (T_C) to the selected case depth.

20. (CURRENTLY AMENDED) The ~~article~~ housing of claim 19, wherein the induction hardened case comprises a martensitic microstructure.

21. (CURRENTLY AMENDED) The ~~article~~ housing of claim 20, wherein the martensitic microstructure is a tempered martensitic microstructure.

22. (CURRENTLY AMENDED) The ~~article~~ housing of claim 21, wherein the tempered martensitic microstructure is formed by the induction heat treatment.

23. (CURRENTLY AMENDED) The ~~article~~ housing of claim 22, wherein the tempered martensitic microstructure has a hardness of about R_C 40 - 50.

24. (CURRENTLY AMENDED L) The ~~article~~ housing of claim 23, wherein the tempered martensitic microstructure extends from the outer surface to the inner surface in the heat treatment portion.

25. (CURRENTLY AMENDED) An induction coil, comprising:

a hollow metal channel having a first termination portion, a second termination portion and a semi-rectangular inductor portion that is operably connected to the first termination portion and the second termination portion, semi-rectangular inductor portion including a semi-rectangular lower coil portion and a semi-rectangular upper coil portion, said semi-rectangular upper coil portion being proportionally smaller than said lower semi-rectangular coil portion.

26. (CURRENTLY AMENDED) The induction coil of claim 25, wherein the semi-rectangular inductor portion comprises:

~~a semi-rectangular lower coil portion comprising~~ a first L-shaped section and an opposed second L-shaped section on said semi-rectangular lower coil portion, said first L-shaped section having a first termination end, that is connected to the first termination portion, and a first lateral end, and ~~an opposed~~ said second L-shaped section having a second termination end, that is connected to the second termination portion, and a second lateral end;

~~a semi-rectangular upper coil portion, having~~ a first lateral end and a second lateral end on said semi-rectangular upper coil portion ~~, that is located above and is proportionately smaller than the lower coil portion~~;

a first lateral portion that connects the first lateral end of the upper coil portion to the first lateral end of the lower coil portion; and

a second lateral portion that connects the second lateral end of the upper coil portion to the second lateral end of the lower coil portion.

27. (ORIGINAL) The induction coil of claim 26, wherein the hollow metal channel is rectangular having an outer width of about 10 mm and an outer height of about 10 mm and a thickness of about 1.1 mm.

28. (NEW)The method of claim 12, wherein the first semi-rectangular portion is smaller than said second semi-rectangular portion.

29. (NEW)The method of claim 12 wherein first semi-rectangular portion includes a first L-shaped portion having a first lateral end and opposing a second L-shaped portion having a second lateral end, said first and second L-shaped portions defining an opening between said first and second lateral ends.